

A NEW SPECIES OF *Aedes* (*Stegomyia*) FROM THAILAND
(DIPTERA: CULICIDAE)^{1,2}

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ABSTRACT—Both sexes, larva and pupa of *Aedes* (*Stegomyia*) *seatoi*, n. sp., from Thailand are described. Characters for separating the new species from closely allied ones are given.

It was previously reported (Huang, 1968) that *Aedes pseudalbopictus* (Borel) and one or more members of the *scutellaris* subgroup were being mistaken for *albopictus* (Skuse). The new species described here, which looks so much like *albopictus* in the adult and *aegypti* (L.) in the larval stage, now complicates the picture still further, especially as it has also been found in the same larval habitats.

In view of this unfortunate situation it has been considered desirable to describe the new species at the earliest opportunity. Nothing is known about its biting habits or its potentiality as a vector of human pathogens and hence it is also hoped that this note will stimulate investigations on these subjects and help to clear up what appears to be a rather confused situation. In order to facilitate such work diagnostic characters for separating the new species from those most likely to be mistaken for it are also given.

Aedes (*Stegomyia*) *seatoi*, n. sp.
(Fig. 1)

This species is named for the SEATO Medical Research Laboratory, Bangkok, Thailand, in recognition and appreciation of the valuable contribution that the Department of Medical Entomology has made to our knowledge of the mosquito fauna of Thailand.

MALE. *Head*. Proboscis dark scaled, as long as fore femur; palpus longer than proboscis, with a white basal band on each of segments 2-5, those on segments 4, 5 incomplete dorsally, segments 4, 5 subequal, slender, upturned, and with only a few short hairs; antenna plumose, slightly shorter than proboscis; clypeus bare; torus covered with white scales on inner and outer sides; decumbent scales of vertex all broad and flat; erect forked scales dark, not numerous, restricted to occiput; vertex with a median stripe of broad white scales, similar dark ones on each side interrupted by a lateral stripe of broad white scales followed by a patch of white scales ventrally. *Thorax*. Scutum with narrow dark scales and a prominent median longitudinal stripe of similar white ones, the median stripe reaches from the anterior margin to the middle of the scutum where it becomes very narrow or broken and

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Fig. 1

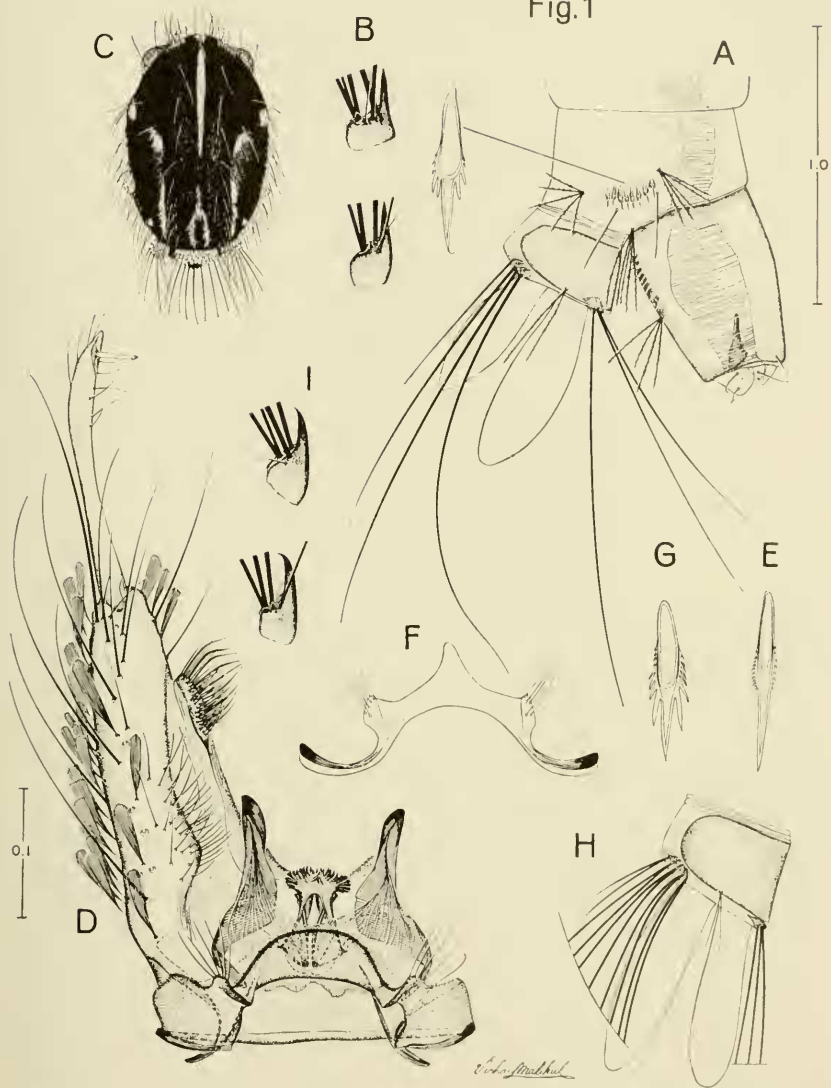


Fig. 1. A-D, *Aedes (Stegomyia) seatoi* n. sp.: A, lateral aspect of the terminal segments of the fourth instar larva with enlarged comb scale; B, meso- and metapleural spines of the larva; C, dorsal aspect of the holotype terminalia; D, tergal aspect of the holotype terminalia. E-F, *A. (S.) albopictus* (Skuse): E, comb scale of the larva; F, tergum IX of the male terminalia. G-I, *A. (S.) aegypti* (L.): G, comb scale of the larva; H, ventral brush of the larva; I, meso- and metapleural spines of the larva.

is followed by an inverted Y-shaped marking which forks at the beginning of the prescutellar space. There is on each side of this: (1) a posterior dorsocentral white line which does not reach to the middle of the scutum and which sometimes becomes very narrow or broken at the level of wing root, (2) a small white patch of similar scales at a little distance anterior to the posterior dorsocentral white line, (3) a few narrow white scales on the anterior prescutal area and some narrow white ones on the scutal angle area where they form a small white patch, (4) a patch of broad flat white scales on the lateral margin just before the level of the wing root and a few similar scales on the posterior portion of the supraalar area; there is no complete supraalar line of broad white scales; acrostichal bristles absent; dorsocentral bristles present; scutellum with broad white scales on all lobes and with a few broad dark ones at the apex of mid lobe; anterior pronotum with broad white scales; posterior pronotum with broad white scales and some dark narrow ones dorsally; paratergite with broad white scales; postspiracular area without scales; patches of broad white scales on propleuron, on the subspiracular area, on the upper and lower portions of the sternopleuron and on the upper and lower portions of the mesepimeron; mesepimeron scale patches connected forming a V-shaped white scale patch, the open side of the V being directed backwards; lower mesepimeron without bristles; metameron bare. *Wing*. Wing with dark scales on all veins except for a minute basal spot of white scales on the costa. *Halter*. With dark scales. *Legs*. Coxae with patches of white scales; kneespots present on all femora; fore and mid femora dark with some pale scales scattered anteriorly, more so on the mid than on the fore femur, paler posteriorly; hind femur anteriorly with a broad white longitudinal stripe which widens at the base and is narrowly separated from the apical white scale patch; fore and mid tibiae dark anteriorly, paler posteriorly; hind tibia dark; fore and mid tarsi with basal white bands on tarsomeres 1-3; hind tarsus with basal white bands on 1-4, 5 all white; fore and mid legs with tarsal claws unequal, the large one toothed, the smaller one simple; hind leg with tarsal claws equal, simple. *Abdomen*. Abdominal segment I with white scales on the laterotergite, tergum I with a large median patch of white scales. Terga II-VI each with a basal transverse white band which widens laterally except on tergum II where it widens in the middle; all segments with lateral white spots which are not connected with the basal transverse bands; sterna I-III largely covered with white scales; IV-VI each with a basal white band. *Terminalia*. Basimere 3 times as long as wide; its scales restricted to dorsolateral, lateral and ventral areas; with a patch of hairs on the basomesal area of dorsal surface; claspette long, reaching to 0.75 of basimere, with numerous setae and several widened specialized curved ones on the slightly expanded distal part; distimere simple, elongate, 0.75 as long as basimere; with a spiniform process at the apex and with some hairs; aedeagus with a distinct lateral sclerotized toothed plate on each side; paraprocts without teeth; cercal setae absent; ninth tergum with middle part produced into a large rounded lobe and with two small hairy lateral lobes.

FEMALE. Essentially as in the male, differing in the following respects: palpus 0.2 of proboscis, with white scales on apical half. Fore and mid legs with tarsal claws equal, simple. Abdominal tergum II with basal white band also widening laterally.

PUPA. *Cephalothorax*. Both hairs 1-C and 3-C single, longer than 2-C; hair 6-C single, shorter than 7-C; hair 5-C branched. *Metanotum*. Hair 10-C branched,

mesad and caudad of 11-C; hair 11-C single. *Abdomen*. Hair 1-I well developed, with more than 10 branches, dendritic; hair 2-I single; hair 3-I single; hair 2-I and 3-I not widely separated, the distance between them as the distance between 4-I and 5-I; hair 1-II branched; hair 2-II laterad of hair 3-II; hair 2-IV-V mesad of hair 1; hair 3-II and 3-III simple, shorter than segment III; hairs 5-IV, 5-V and 5-VI single or double, not reaching beyond the posterior margin of the following segment; hair 9-III-VII strongly developed, thickened; hair 9-VIII with a strong main stem and lateral branches of varying length; paddle margins with fringe; hair 1-P single.

LARVA. *Head*. Antenna 0.5 length of head, without spicules; 1-A inserted near middle of shaft, single; inner mouth brushes pectinate at tip; head hair 4-C well developed, branched, closer to 6-C than 5-C, cephalad and mesad of 6-C; hairs 5-C single, 6-C single, 7-C 2-branched; mentum with 10-12 teeth on each side. *Thorax*. Basal spine of meso- and metapleural hairs stout and straight or slightly curved. *Abdomen*. Comb of 8-10 scales in a single row, each scale with prominent denticles at base of the apical spine; pentad hair 2-VIII distant from 1-VIII; siphon short, less than 2 times as long as wide, acus absent; pecten teeth 8-12 in number, evenly spaced, each tooth with 2-4 basal denticles; 1-S 4-branched, inserted beyond last tooth and in line with the teeth; saddle incomplete; marginal spicules very small and inconspicuous; 1-X 2-branched; 2-X 2-branched; 3-X single; ventral brush with 4 pairs of hairs on grid, each hair usually single, sometimes, however, one or two of the proximal ones double; without precratal tufts; gills longer than the saddle, lanceolate.

TYPE DATA. Holotype male (BC-03019-1) with associated larval and pupal skins and terminalia on a slide, Bangphra, *Chon Buri*, THAILAND, collected as a larva in a bamboo cup, 2-3 m. height above ground, partially shaded, in an orchard plantation, 27.IX.1968, (Kol's Team collectors). Deposited in the U.S. National Museum. Allotype female (BC-03019-3) with associated larval and pupal skins, all with same data as holotype. Deposited in the U.S. National Museum. Paratypes: 3 males, 2 females as follows: 2 males (BC-02965-3, 4) with associated larval and pupal skins and terminalia slides, 1 male (BC-02965-100) with associated pupal skin and terminalia slide, Bangphra, *Chon Buri*, THAILAND, collected as larvae or pupa in a bamboo pot, set on the ground, partially shaded, in a village, altitude 13 m., 23.IX.1968, (Kol's Team collectors); 1 female (BC-02998-4) with associated larval and pupal skins, Bangphra, *Chon Buri*, THAILAND, collected as a larva in a bamboo pot, set on the ground, heavily shaded, in a mangrove forest, altitude 5 m., 17.IX.1968, (Kol's Team collectors); 1 female (BC-03005-2) with associated larval and pupal skins, Bangphra, *Chon Buri*, THAILAND, collected as a larva in a bamboo pot, set on a mangrove tree, partially shaded, altitude 5 m., 17.IX.1968 (Kol's Team collectors). Deposited in the U.S. National Museum and British Museum.

DISTRIBUTION. Known only from THAILAND where specimens have been collected from Hinlub village, *Kanchanabur*, Khao Mai Kaeo

and Bangphra, *Chon Buri*. Material examined consisted of 24 adults (17 males, 7 females), 23 pupae, 28 larvae, 17 male terminalia slides; 23 adults from individual rearings.

TAXONOMIC DISCUSSION. *A. seatoi* n. sp. is a very interesting species which superficially resembles *Aedes (Stegomyia) unilineatus* Theobald (Barraud, 1934; Muspratt, 1956) in the adult stage in the scutal markings. It can easily be distinguished from *unilineatus*, however, by the presence of a large median patch of white scales on abdominal tergum I and by the absence of a prominent white spot on the anterior surface of the mid femur. It is closely related to *albopictus* (Skuse) with which it shares the presence of a prominent median longitudinal white scutal stripe, a patch of broad flat white scales on the lateral margin just before the level of the wing root and similar pleural and abdominal markings. It can be separated from *albopictus* by the presence of a small white patch of narrow scales on each scutal angle and a similar white patch just anterior to the posterior dorsocentral white line on each side. When scutal markings are rubbed off *seatoi* can easily be misidentified as *albopictus*. However, it can be distinguished by the large median patch of white scales on abdominal tergum I which in *albopictus* is dark scaled. The male terminalia of *seatoi* though very similar to those of *albopictus* differs in having the ninth tergum with the middle part produced into a large rounded lobe whereas there is a conspicuous horn-like median projection in *albopictus*. The pupa of *seatoi* resembles that of *albopictus* but can be recognized by having abdominal hairs 9-V-VI strongly developed and thickened whereas they are weak and thin in *albopictus*. The larva of *seatoi* is also very similar to that of *albopictus* but can easily be identified by having the comb scale with prominent basal denticles at the base of the apical spine. In *albopictus* the comb scale has only very fine denticles or fringes in this position. Having the *aegypti* type of comb scales, *seatoi* can easily be mistaken for *aegypti*. However, it differs in having the ventral brush with 4 pairs of hairs, each of which is usually single whereas in *aegypti* there are 5 pairs of these hairs, each of which is branched, also the meso- and metapleural spines in *aegypti* are thicker and hooked apically.

BIOLOGY. The immature stages of *seatoi* have been collected in bamboo pots placed: (1) in an orchard plantation and in a village (BC-02965, BC-02986, BC-03009, BC-03019), (2) set on the ground in a mangrove forest (BC-02982, BC-02998), (3) set in a mangrove tree (BC-03005). It was also found in banana trees (KB-51-12, CL-12-100). On two occasions the immature stages were associated with *albopictus* (BC-02965, BC-02986); on two others with *aegypti* (BC-02998, BC-03005) and once with *albopictus* and *Armigeres* sp. (BC-03009).

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REFERENCES

- Barraud, P. J.** 1934. The fauna of British India including Ceylon and Burma. Diptera 5, family Culicidae, tribes Megarhini and Culicini. Taylor and Francis, London, 463 pp.
- Huang, Y. M.** 1968. Neotype designation for *Aedes (Stegomyia) albopictus* (Skuse) (Diptera: Culicidae). Proc. Ent. Soc. Wash. 70(4):297-302.
- Muspratt, J.** 1956. The *Stegomyia* mosquitoes of South Africa and some neighbouring territories. Mem. Ent. Soc. S. Afr., No. 4, 138 pp.

BOOK REVIEW

Ecology and Biogeography of High Altitude Insects. M. S. Mani. 1968. W. Junk, The Hague, Netherlands, Series Entomologica, Vol. 4. xiv + 527 pp., 80 figs. \$27.80.

This book is likely to be useful to graduate students and investigators studying the ecology and distribution of insects; it contains ample discussions of principles and numerous and well-documented references. The author, of St. John's College, Agra, India, became well known in 1962 when he published a book entitled "Introduction to High Altitude Entomology," which dealt mainly with the Himalayan Mountains. Since then, he has broadened his scope by studying collections from various European and Central Asiatic mountains and by collecting personally in several ranges in Russia. Here, he provides introductions to the terrain and insect fauna of most of the world's important mountains. The emphasis is on ecology so far as principles are concerned, and the book presents the characteristics of high altitude insects well, though a larger portion of the book is devoted to the review of different mountain ranges.

Among the ecological specializations of high altitude insects are the following: 1. Melanism, frequently including deeper tones of yellow, orange, etc., than at low altitudes, in addition to black and brown. 2. Reduction or loss of wings; percentages of brachyptery and apterism increase with altitude. 3. Smaller body size. 4. Sometimes an increase in insulation, as in more air space under the elytra of some beetles. 5. More species with protective hairs, scales, body waxes, in some cases thus retarding evaporation from the body. 6. Greater ability to withstand cold. Though the special peculiarities of mountain insects often are marked, nearly every one of the peculiarities occurs in some lowland forms.

On mountain tops some important factors are the protective snow cover, ability to withstand or avoid strong winds and intense light, development of favorable hibernation habits and life cycles, and the very frequent utilization of open surfaces of snow or glacial ice as foraging areas. Glaciers are "storehouses of food" both